SYNOPSIS

On

"IMPACT OF AUTOMATION ON WORKFORCE:A STUDY OF SELECTED PHARMACEUTICAL COMPANIES IN HIMACHAL PRADESH"

Submitted
To

Alakh Prakash Goyal Shimla University

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TABLE OF CONTENTS

Sr. No.	CONTENTS	Page No.
1	Introduction	4-6
2	Review Literature	7-13
3	Need of the study	14
4	Research Gap	15
5	Scope of study	16
6	Study Area	17
7	Objectives of the study	18
8	Hypotheses of the study	19
9	Research Methodology	20
10	Sampling of the study	21-22
11	Proposed Chapter	23
12	References	24

1. INTRODUCTION

What is Automation?

Automation is the implementation of machines to carry out most of the repeatable and important functions in pharmaceutical industries. The industries have been developing at a greaterpace, and in the case of the pharmaceutical industries, it'snothing different. The regulatory requirements are gettingstricter than before.Automated functions can help industrial management in keeping up with the ever-changing regulatory constraints. The tradition of implementing newer technologies that replace human power has been taking place in various industries across the world for many years now. Work unions and other communities have always been against this tradition as the latest technologies can always have a major impact on job opportunities in the industries. Lately, the use of computer vision systems for quality assurance purposes has noticeably increased. As a result, human inspectors could be replaced by these systems. The advances in both computer hardware and software technologies has led to many significant advances. This technology provides a greater level of flexibility and repeatability at relatively low costs. This permits higher plant throughput without compromising with the quality of products. Currently, these systems are being developed as an integral part of pharmaceutical processing plants for online and real-time quality evaluation.

1.1 Automation in Pharmaceutical Industry

The trends in Pharmaceutical industry in last couple of years have been a mixed bag. On one side global pharmaceutical business is nearly USD 1.2 trillion with growth of 7-8%. Indianpharmaindustryisalsotreadingthesimilartrend.Businessvolumeshavetouched nearly 20 billion USD. The future outlook for Indian Pharmaceutical industry is also interesting. Various estimates as shown in Figure 1 & 2 and also by PWC, IMS expects growth of >15% & volumes likely to double by2020.

Automation is definitively transforming pharma, with regard to product development, commercial production and real-time monitoring. It can foster manufacturing excellence by leveraging sensors and identification systems to not just help companies achieve compliance, but also to do so at the lowest costs. Indeed, many pharma manufacturers have deployed Corrective Action, Preventive Action (CAPA) software to adhere to

GMP and FDA norms.Theothersideofithasbecomechallenging&complexatmosphere.Intensecompetition , mergers & acquisition, patent cliff, rising drug discovery cost, harsher regulations and price controls, coupled with reduced customer interest for sales calls, talent crunch & high attrition etc. have made significant contribution to complexities. Hence, problem is really complex in nature of managing both present & future. Therefore, one of the important agendas in management boardroom today is developing people to handle current challenges & preparing organization for future. The trusted partner toachieve this agenda is Human Resource and Training & Development (T&D) functions.
Companies are replacing conventional T & D approaches with new initiatives.

At present, India lags behind its global peers in Industry 4.0 adoption. A significant portion of the Indian manufacturing sector is still in the nascent stages of adopting Automation on its shop floors. Adopting automation will be crucial to be able to achieve this. The Government of India launched the SAMARTH (Smart Advanced Manufacturing and Rapid Transformation Hub) - Udyog Bharat 4.0, an Industry 4.0 initiative, under the ambit of the Department of Heavy Industry & Public Enterprise. SAMARTH aims to raise awareness about automation among the Indian manufacturing industry through demonstration centers. SAMARTH aims to bridge the quality gap between Indian products and their foreign counterparts and help MSME's to adopt new technologies to enable quality exports. SAMARTH Udyog encompasses a consortium of manufacturers, vendors, and customers as the main stakeholders. Some of the other initiatives taken by the Government of India include the National Program on Artificial Intelligence with NITI Aayog and the Mission on Cyber-Physical Systems.

Currently manufacturing industries have switched to customized production from mass production. Due to advancement in manufacturing technologies productivity and qualitative engagement increased across product and services. Automation describes the new models of smart organization spread over the full value chain. Few concepts which form the core of automation dream include IOT, Industrial Internet, and ArtificialIntelligenceetc.Foravisiontotranslate intoactionandrealityitiscriticalthat we understand the concept, its requirements and also see the current level of preparednessofindustrybytheownersandemployeestoo,toconvertthevisioninto reality.

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portion of the Indian manufacturing sector is still in the nascent stages of adopting Automation on its shop floors. The integration of physical systems on cyber platforms, the basic premise of Industry 4.0, is still at its infancy. Furthermore, the MSME segment has very little access to automation technology due to the high-cost barrier. The Government of India has set a target of increasing the contribution of manufacturing output to 25 percent of GDP by 2025, from about 17 percent currently. Adopting Industry 4.0 will be crucial to be able to achieve this. The Government of India launched the SAMARTH (Smart Advanced Manufacturing and Rapid Transformation Hub) - Udyog Bharat 4.0, an Industry 4.0 initiative, under the ambit of the Department of Heavy Industry & Public Enterprise. SAMARTH aims to raise awareness about Industry 4.0 among the Indian manufacturing industry through demonstration centers. SAMARTH aims to bridge the quality gap between Indian products and their foreign counterparts and help MSME's to adopt new technologies to enable quality exports. SAMARTH Udyog encompasses a consortium of manufacturers, vendors, and customers as the main stakeholders. Some of the other initiatives taken by the Government of India include the National Program on Artificial Intelligence with NITI Aayog and the Mission on Cyber-Physical Systems.

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2. REVIEW OF LITERATURE

There are various roles HR professionals has to perform, namely, employee advocate, human capital developer, functional expert, strategic partner and leader (Ulrich &Brockbank, 2005). Several studies have reviewed the industry's declining productivity and the growth of emerging markets as key revenue contributors (S.M. Paul, et al. 2010) (M. Kessel et al. 2011) Kumara &Pandey (2011) revealed in his studies that there was no significant difference among the turnover, intentions of library working personnel by their place of work states that the job performance of individuals workers may vary with the extent of ambivalence being experienced by them during work time.

In addition, Kessel considers that the pharmaceutical sector is going to encounter more stringent regulatory pathways for approval of new drugs, as well as closer government scrutiny of the continued marketing of existing drugs. This role can be used to mitigate the negative effects of anxiety andcareerdoubt(Rizvi,2011),whichisvitalinindustry4.0astheintroductionofnewof technology results in job collapse, deskilling, job insecurity and increasing inequities Ray &Ray (2011). focused HRM practices and its impact on job satisfaction in selected ironandsteelfirminIndia.Factorslikeself-directedworkteams,jobrotation,recruitment and selection have very little impact on jobsatisfaction.(I. Khanna et al. 2012), the transitioning of commercial models The current pharmaceutical model is transitioning to that of a lean, focusedentitywitharesearchfootprintwithinkeyinnovationbio-clustersandagrowing revenue stream from specialty products and biologics through emerging markets. Human resource professionals as employee advocates need to engage with employees establish personal career objectives for them and formulate a plan of action to achieve these objectives (Sharma, 2012). In the age of digitization, it is vital for HR professionals to become change agents; they need to assess the current state of the organization, deal with employees' resistance to change and provide employees with the necessary competencies to deal with changes (Sharma,2012; Sheehan, De Cieri, Greenwood)This role requires HR professionals to develop HR systems and arrange for HR development (HRD) audits to keep abreast of how HRD systems are functioning in the organization(Sharma,2012). The strategic partner role requires HR professionals to identify the main areas requiring attention with regard to people and technology (Sharma, 2012).Contribute towards giving their organization a competitive edge in terms of their human capital by selecting and hiring the best candidates (Sharma, 2012). The training programs given to employees have positive impact on their level of organizationalcommitment.Ahmed&akhtar(2012)attemptedtodeveloparesearchscale to assess

the effective implementation of HRPs in General Public Sector Universities (GPSUs) ofPakistan. Humanresourceprofessionalsasfunctionalexperts.The role of HR professionals as employee advocates involves addressing the current needs of employees by listening and empathizing with them (Bakuwa, 2013; Mamman, Rees, Bakuwa,)Therole of HR professionals as human capital developers involves overseeing and advancing HR collectively or individually, with the objective of equipping employees to thrive in the future (Bakuwa, 2013). The functional expert (previously known as administrative expert) role is associated with the human capital practices that are key to the HR value (Bakuwa,2013). The strategic partner role of HR professionals comprises of dimensions such as consultant, business expert, knowledgemanager,changeagentandstrategicHRplannerwhofacilitatetheHRsystems to achieve the organizational goals (Bakuwa, 2013). In a leadership role, HR professionals are required to act as credible leaders and partner with other leaders to set and improve the level of strategic thinking (Bakuwa, 2013). Olusegun(2013)concludedthatthereissignificantrelationshipsbetweenjobsatisfaction and turnover intention in a study conducted among the employees of universities insouth westNigeria. The leader role relates to the credible activist competency of HR professionals, which requires them to be self-aware and dedicated to developing their profession (Sheehan et al., 2014; Ulrich, Younger, Brockbank). Strategic HR activities help boost the productivity of employees, and future productivity results should indicate how employees use technological innovations (Al Mamun, Shamima, & Islam, 2014). Jeet&sayeeduzzafar (2014).showed that the HRM Practices like training, team work, performance appraisal and compensation have the significant impact on job satisfaction. Employee Particiation has no significant impact on job satisfaction of the future of manufacturing predicted by Industry 4.0 consists in system integration, where every manufacturing aspect autonomously exchange data and information, provokesactionsandcontrolledindependently.Thismanufacturingapproachthataimsto create smarter processes is characterized by digitalization and decentralization of manufacturingnetworksthatactwithouthumaninterventionandcontrolledautonomously all their operations depending on their environment and requirements [S. Erol, A. Jäger et.al.].TheIndustry4.0conceptisanewapproachthatwillbringthedigitalandphysical worldstogether.

Chauhan&patel (2014) concluded in his studies that recruitment and selection, carrier growth,workingconditionshaveapositiveimpactonjobsatisfactioninthehotelindustry in Udaipur (India) .All the HRM dimensions exercised in the hotels of Udaipur division do not satisfied

the employeesequally.The human capital developer role entails the management and development of employeestomeetfutureneedsoftheorganization(Mamman&Kulaiby,2014). Smart factory is a promising solution for achieving flexible production goals, such as market dynamic requirements, production targets and cost saving (A. Radziwon et. al. 2014) in dynamic production environments and increasing complexity.Suifan (2015) in his study focused upon examining the effect of HRM practices (i.e. training, person organization fit, and rewards). The pharmaceutical and biopharmaceutical sector has seen significant changes in its operating model and footprint over the past couple of decades according to (A. Gautam et. al. 2015). Lal et al. (2015). Found that with the change in the scenario of working environment, the ways of performing job roles have undergone a drastic change. It was found that the job satisfaction is related directly to employee turnover/retention rates & absenteeism and indirectly related to job performance and productivity in the industrial setup. Industries and researchers hold different opinions about the Industry 4.0 concept, visions and its adoption, but there is a consent about the main condition that address the future manufacturing vision (Procedia CIRP 54 2016): (1) Smart Factory, (2) SmartProducts, (3)BusinessModelsand(4)Customers.InIndustry4.0frameworktheterm“smart”is becoming significant, though it is difficult to find a scientific definition. However, a possible definition of this “smart” concept that meets various researchers’ vision can be correlated with autonomous devices that are able to communicate in real-time with other smart devices, independently making decisions and performing actions based in the obtained data (J. Qin, Y. Liu et. al.2016). . “Industry 4.0”, a new industrial revolution addressed smart factory as one of the key aspects, resulted from several developments that consisted in integration, digitizationandtheuseofflexiblemethodsandsmartsolutions(G.Urbikain,et.al.2016). A particular focus on research and development (R&D) of pharmaceuticals is evident in research by Sugiyama et al. [H. Sugiyama, et al.], as the drug development period is regarded as the critical factor in determining success. This unique characteristic of the industry is due to R&Dactivitiesthatincludeclinicaltrialsandapprovaloftheregulatoryauthorities,which require long time durations, combined with the strong desire of companies to sell the productwithinitspatentedtimeframe.InJapan,thedurationoftheR&Ddevelopmentis in the range of 9–16 years, whereas patent protection normally lasts 20–25 years (J.P.M. Association, 2017). Human resource should start by preparing the changes they will need to meet the needs of organizational digital transformation (DiRomualdo, El-Khoury, &Girimonte, 2018). The average cost of developing a new drug is estimated to be about 1.0–1.2 billion USD, including expenditure on failed projects.As such, employees will have to be retrained to accommodate this transformation. The employee advocacy role requires HR professionals to

serve the interests of employees, as well as execute other roles towards stakeholders of the business that recruited the employee (Mamman et al., 2019). (De Ruyter, Brown, & Burgess, 2019).On organizational commitment in Jordanian public and private organizations. Industry 4.0 brings about new technological advancements and job opportunities (De Ruyter et al., 2019), Through the integration and cooperation of these emerging technologies, it will be possible to modify the centralized production model to a decentralized model, where production elements can communicate with one another and make autonomous decisions There is little doubt that the regulators are going to focus increasingly on patient safety and benefits when bringing new drugs to market (Pricewaterhouse Coopers 2020). (Darrin Baines, Darrin Baines, Darrin Baines, Darrin Baines) found that Leading pharmacists are aware that technology can disrupt society and the economics of pharmacy. Over thirty years ago, Hepler argued that technology, economics, and social values are the major forces shaping pharmacy's future.[10] Amongst the technological forces shaping pharmacy practice, Helper cited computers, robotics, communications and therapeutics as the stimulants of change. Amongst the important economic factors, he listed managed care, payment for outcomes and the marketing services as the factors most likely to have the largest effect. Finally, Hepler believed that an aging population, the weakening of professional authority and a deterioration in pharmacy's public image were having the biggest social impact on the profession. In response, he argued that pharmacists should return to their fundamental relationship with society by accepting the ethical responsibility for drug-use control. To accomplish this goal, pharmacy would need to undergo a process of occupational reconstruction and self-renewal in order to become providers of a new societal model of practice, which Hepler and Strand refer to as “pharmaceutical care”. They state: Pharmaceutical care is the responsible provision of drug therapy for the purpose of achieving definite outcomes that improve a patient’s quality of life. These outcomes are: (1) cure of a disease, (2) elimination or reduction of a patient’s symptomatology, (3) arresting or slowing of a disease process, or (4) preventing a disease or symptomatology. (IshitaAdhikari, NeerajSinghal) mentioned in their study its evolution and integration with embedded systems to cyber-physical systems in context of the pharmaceutical manufacturing units. Industry 4.0‖ integration with production technologies and processes lead to a new technological age which will further result in a radical transformation of industry and production value chains and service model. The review supports in understanding that pharmaceutical manufacturing industry will be able to produce, efficient and customized production at reasonable cost. However, this needs a faster than usual attention and unless the preparedness level of leadership team, infrastructure and employees at large in pharmaceutical manufacturing units

are not gauged, we are likely to miss the bus. It's largely written on the wall that implementation of the ―Industry 4.0‖ needs focus on increased research on the areas and figure out the challenges in execution of the ―Industry 4.0‖ vision. The journey towards execution of ―Industry 4.0‖ is a long road and checking preparedness of Indian Pharmaceutical companies needs paramount attention. Further, investigation using focus group discussion and case study of leading pharmaceutical organization in the country is recommended. As we explore ―Industry 4.0‖ preparedness, concept of Industry 5.0, which focuses on co-existence of machine and humans, takes seed. (AntonellaPetrillo, Fabio De Felice, RaffaeleCioffi and Federico Zomparelli)mentioned in their study several advanced economies are implementing the concept of Industry 4.0, marking the fourth industrial revolution. Increasingly, companies are applying innovative solutions, including through the "Internet of Things" (IoT), cloud computing, miniaturization, and 3D printing, that will enable more interoperability, flexible industrial processes, and autonomous and intelligent manufacturing. The new industrial revolution will be characterized by merging of technologies. Among the consequences of "Industry 4.0" and structural problems in the world, economy will be an escalation in competition at the geo-economic level. Industry 4.0 will concur to create new wealth and further improve living standards. The implementation of a 4.0 systems has considerable advantages. This chapter has analyzed a series of data showing efficiency increase and cost reductions for European companies that have implemented smart manufacturing systems. The implementation of a 4.0 system represents a real revolution within the company. In addition, the implementation of intelligent systems implies a considerable economic investment, and often the company cannot assess the economic return of that investment. For this reason, it is necessary to develop national or regional investment plans to encourage companies to invest in the 4.0 revolution. Companies that remain out of this revolution could disappear, as they would remain technologically obsolete with respect to their competitors. Before developing digitized systems, it is necessary to check if there are any prerequisites within the company to ensure the correct implementation of the new system. If there are no proper prerequisites, the first step to digitizing the company is to invest in training and information activities to train operators. As far as training.operators in the chapter, the formation of the new working class 4.0 has been of great importance. Communication should start from high school, through school-work alternation and by providing basic knowledge of computer science and robotics, to make it clear to young workers what is the trend toward which we are moving. This chapter has also analyzed the various changes that companies will face, distinguishing between developed countries and developing countries. In addition, business, economic, and financial

opportunities that can be exploited by implementing Industry 4.0 systems have been described. The chapter also presented softly the most important intelligent factory technologies such as big data and cloud data analysis systems, cyber-physical systems that allow self-regulating operations run by intelligent robots, simulation systems and virtual reality to train addicting operators, and additive manufacturing to develop more and more customized products that meet customer needs. In conclusion it is worthy to note that to face the challenges of the future it is strategic to digitize manufacturing processes and implement intelligent automated systems that can self-manage. The commitment must be extended not only to companies but also to governments, whose task is not only to develop investment plans that are easy for companies wishing to renew their processes but also to train young workers from high schools by making compulsory modules of computer science, automation, and foreign languages, to create a new generation of "workers 4.0" who possess the hard and soft skills needed to operate within the intelligent factory. Only in this way, it will be possible to properly implement the new Industry 4.0 practices and to make technological advances to companies and the whole civilization.(S. Hemanth Kumar*, DivyaTalasila, M. P. Gowrav, H. V. Gangadharappa) mentioned in their study Pharma has typically been a disinclined industry; regulators encourage stimulating it into the Pharma 4.0 approach. Pharma 4.0 helps industries to maximize productivity. By implementing the Pharma 4.0 holistic control strategy across the value network, it improves product safety, quality, transparency, flexibility, and productivity. Advanced analytics, robots, sensors, and automation of complex decisions change the efficiency, speed, response, and quality of processes. By employing these technologies, it increases productivity, shift economics, and fastens the industrial growth. The obstructions will fall, in time, and Pharma 4.0 will become a new standard in the upcoming period. Even after these advancements in Pharma 4.0 still, there is scope for innovation and advancement in the development of pharmaceuticals.

The convergence of IT and healthcare is another area that will influence the big pharma model over the coming years according to. Big data and mobile health are starting to transformhealthcareanddiagnosticsinasignificantway,withnewplayerssuchasApple and Google acting as increasingly disruptive catalysts. Medicines paired with companion diagnostics have been a successful strategy to gain market access, with firms such as AstraZeneca,Roche,NovartisandSanofiprogressingasmuchas60–80%oftheirclinical portfolios with companion diagnostics. In the personalized and precision medicines era, this strategy will probably translate into medicines accompanied with apps or wearable devices that help patients monitor key parameters and manage their diseases. Research conducted by Masood

and Egger explored augmented reality (AR) and its impact on the pharmaceuticalindustry.

AR enables bridging the gap between the physical world and the increasingly important digital environment. Currently, the compound annual growth rate (CAGR) of the industrial AR market is projected to be around 74% between 2018 and 2025. The global marketforARandVR(VirtualReality)isprojectedtoreach$814.7billionby2025.This significant growth is likely to be sustained or accelerated as the AR technology matures and the variety of applications within the industry broadens. While the importance of AR is widely accepted, recent research has shown that the implementation for industrial applications ischallenging.

Using a bespoke survey, the research aims to highlight topics such as the current level of adoption of 4.0 technologies in Ireland among pharmaceutical and biopharmaceutical companies, as well as related industries such as consulting and medical devices. It also explorescorporateoutlookon4.0andthefuture,aswellasplannedprojectsandin-house technologicaladvancements.

3. NEED OF THE STUDY

The Development speed of automation and scope of technology disruption is impacting operational activities across all sectors. Manufacturers are adopting cutting-edge technology, automating and digitizing operations, and using sophisticated analytics to analyze data. Pharma is also experiencing upheavals, such as new business models (such as direct-to-customer sales and customized medication) and new product modalities (for instance, cell and gene therapy). Such shifts, which alter not just labor supply and demand but also job characteristics, often elicit popular outrage. Nonetheless, they have the potential to benefit patients, workers, and manufacturers. Technological advancements across sectors promise more efficient and productive operations. Labor markets, for example, may utilize digital talent platforms to connect people with opportunities. Technology also provides new employment and income opportunities—while manual and physical labor is in short supply, socioemotional and technical talents are in high demand. The new business models in pharmaceuticals, in particular, seek to enhance patient experience and results.

Already, digitization is decreasing the amount of human data input, which enhances both data and fact-based decision making. This advancement has benefited managers and individuals in specialist positions, such as engineers and scientists, but the advantages have not yet trickled down to shop-floor employees. Nonetheless, frontline employees' job satisfaction remains high, and more than 70% have optimistic hopes for future improvements.

4. RESEARCH GAPS

New product modalities (such as cell and gene therapy), digitalization, and sophisticated analytics have been and will continue to be the most important disruptors in pharmaceuticalsoperations in Himachal Pradesh. More than 80% of pharmaceuticals manufacturing firms in Himachal Pradesh have already experienced a talent mismatch as a result of these disruptors. Executives see just 10% of the effect of disruption that frontline workers claim they are personally experiencing. In fact, more than half of all frontline employees are already feeling the effects of this disruption in their jobs, and another 25% anticipate to be impacted over the next five years. However, few CEOs expect such a broad effect.While nearly all businesses have or are developing plans to cope with market changes, only around 40% have scaled-up solutions; the majority are stuck in "pilot purgatory."pharmaceuticals Other operations-intensive sectors report a comparable degree of difficulty moving from pilots to wide adoption, which will benefit not just employees but also businesses, since a lack of skills is the most common obstacle that hinders the scaling up of technology..

5. SCOPE FOR THE STUDY

Pharmaceutical businesses all around the globe are suffering as a result of the spread of COVID-19. Nations are shutting their borders and restricting what enters their countries, which is impacting raw material and medication costs and the supply chain. Unlike brand-name medicines, the problem emerges more with generic drug kinds, since the likelihood of a drug shortage is greater during these periods. While remedies to the medication scarcity problem are being developed, the primary focus is on developing a potential Coronavirus vaccine. Furthermore, since this virus is new and yet in its early stages, measures have been put in place all across the globe to ensure public safety. Physically demanding jobs will be replaced by automated manufacturing, necessitating the training of new workers for facility management, maintenance, and restoration in the event of obsolescence. To get a better understanding of the data produced, pharmaceutical firms must integrate analytical methods like as simulation, data analytics, and optimization. However, the required technologies are mainly proofs of concept that have not yet been commercialized.

6. STUDY AREA

STUDY AREA 1: BONSAI PHARMA

Bonsai Pharma Group, established in 1984, is one of the fastest growing National Pharmaceuticals Company with group turnover of more than 20 crores. That have two units at Kishanpura, BaddiSolan, Himachal Pradesh,India as per WHO GMP guidelines with a covered area of above 2 Lacs Sq. Feet. Bosnia Pharmaceutical is manufacturing different segment of products of almost 200 companies.The steps outlined thus far will have salutary effect on the patients since they will be paying less money for better quality drugs particularly for chronic diseases. With the same funds they will be able to continue the prescribed drugs for longer duration.Drugs at reduced cost of high quality, believe will, increase the volume of clientele substantially. The level of satisfaction is bound to rise.

STUDY AREA 2: SPANKER BIOTECH LIMITED

Established as a Limited Company in the year 2007, Spanker Biotech Limited is a leading Manufacturer and Wholesale Trader of wide range of Pharmaceutical Tablet, Syrups, Ointments, Lotions, Creams, Mouth Wash, Sanitizer, Dry Syrups, Neutraceutical Capsules, Pharmaceutical Manufacturers, Pharmaceutical Third Party Manufacturing Facility, P2P Manufacturing Facility Available. Situated in Baddi, Himachal Pradesh, India), we have constructed a wide and well functional infrastructural unit that plays an important role in the growth of our company. We offer these products at reasonable rates and deliver these within the promised time-frame. In addition to this, we are also involved in offering best-in-class PCD Pharmaceutical Franchise to our esteemed clients

7. OBJECTIVES

1. To analyze impact of automation on skilled workforce
2. To examine initiatives of government toward skilled workforce through Training and Development
3. Toempirically study the impact of industry 4.0 on workforce in Himachal Pradesh

8. HYPOTHESES OF THE STUDY

It is Hypothesized that

Hypothesis 1 (H1). Himachal Pradesh Government Resistance to change creates pressure against Industry 4.0 implementation.

Hypothesis 2 (H2). New education programs and courses for Industrial revolution should be launched by the Himachal Government for creating highly skilled workforce

Hypothesis 3 (H3). Himachal Pradesh government should launch capital subsidy and loan schemes to encourage the procurement of advance machine technology

9. RESERCH METHODOLOGY

Researchdesign

The aim of this research is to provide a deeper analysis of the level of digital transformation of the manufacturing enterprises in Serbia and examine their managers' opinions on the most important driving forces and implementation barriers. Since a study is performed concerning the problem that is rather at its preliminary stage (especially in Serbia) without much empirical evidence in the background, an exploratory research design is applied At the beginning of the research the authors developed the hypotheses that are tested within the following study. The hypotheses are based on the relevant literature on Industry 4.0 characteristics and implications.Quantitative quasi-experimental research is used to establish the relationship among the variables studied. The research design is also known as a casual-comparative design and is usedtofindarelationshipbetweenindependentanddependentvariablesafteranoccurrence.

10. SAMPLING OF THE STUDY

"Sampling Procedure is a structure and route maps, which is used as a foundation for the choice of a sample population and impacts many other key elements of a research too though," stated Malhotra et al. (2017). The research demographic, sampling techniques methodologies are included"

1. Population: In statistics, the term “population” has a slightly different meaning from the one given to it in ordinary speech. They might not be able to explicate precisely the population they are concerned with.For the present study, data were collected through questionnaires, interview and discussions with entrepreneurs which follow the below criteria.The sampling technique was exploited to obtain responses from entrepreneurs. The statistical tools were applied for analysis of the collected data.

2.Sample banks: As example pharmaceutical companies, Bonsai Pharmaoperating two units inKishanpura, Baddi,Solan, Himachal Pradesh andSpanker Biotech Limited in Baddi, Himachal Pradeshwere chosen based on their workforce and volume of activity. Only two pharmaceutical companies of Himachal Pradesh were chosen operates in Solan district of Himachal Pradesh and the area for primary data collection is restricted to Solan district of the state of Himachal Pradesh

3. Type of data used - Both Primary data and Secondary will be used for the study.

a) Secondary data- The research is mostly based on secondary data provided by different agencies and groups involved with pharmaceutical industries. The publications of the Indian Pharmaceutical Industry - IBEF, Annual Reports of respective pharmaceutical companies, Data published by the Department of Pharmaceuticals, Survey of the Government of India, Department of Pharmaceuticals, reports of National Center for Biotechnology Information, and published reports, books, journals, and official websites of pharmaceutical companies, universities, organizations, and so on.
b) Primary data - The collection of primary data was limited to the state of H.P, thus the universe of the research consists of Bonsai Pharma and Spanker Biotech Limited in Solan District of Himachal Pradesh. The sample respondents will be chosen using a multistage random sampling method. The first step involves selecting a one company from among the two pharmaceutical companies. Each of the two companies was assigned one district, with the understanding that all such companies has how much workforce and volume of activity are more concentrated.

4. Sampling size:There are often too many participants in a population to study appropriately; an inquiry is thus always restricted to one or even more samples taken from it. While most information about a particular population parameter can incorporates into a well-selected sample, it should be possible to draw true lessons from a population of the sample between the sample and the population.Sample size is the term used in market research to describe the number of subjects in the sample. We understand groups of subjects selected by sample size from the general population and for this particular study are consider representative of the real population.

In the research eight Social Organizations are been selected by us, functioning for schooling, abilities exercise, welfare, income, security and safety matters principally for womenfolk will be researched and the leaders, employees and beneficiaries would be the respondents.

In this study we took approx. 1000000 as a population based on total beneficiaries served in recent years and we perform **Cochran formula** on our population size

$$n_0 = \frac{Z^2 pq}{e^2}$$

Where:

e is the desired level of precision (i.e., the margin of error),

p is the (estimated) proportion of the population which has the attribute in question,

q is 1 – p.

Solution: $((1.96)^2 (0.5) (0.5)) / (0.05)^2 = 385$

As we get $n_0 = 394$ at for 95% of Confidence level and 5% margin of error.

From **Cochran formula** we get 394 as our sample size. In this study we circulate total of 515 responses form and we get 472 responses from circulated questionnaires and out of 472 responses, 33 responses were filled less than 10% and they were incomplete while 439 responses are correct and accurate. We take 439 responses from our sample space for further analysis. Since it is more than Cochran formula so we can say that we have taken adequate samples for data analysis hence our study is going to be effective.

11. PROPOSED CHAPTERPLAN

- Chapter 1. Introduction
- Chapter 2. Company Profile
- Chapter 3. Review of literature
- Chapter 4. Research Methodology& Research Design
- Chapter 5. Analysis of Research Data
- Chapter 6. Limitations, Conclusions&Recommendations
- Bibliography
- Annexure

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